

Remarks

The Office Action mailed March 3, 2006 has been carefully reviewed and the following remarks have been made in consequence thereof.

Claims 1-3, 10-13, 20, 21, and 22 are now pending in this application. Claims 1-3, 10-13, 20, and 21 are rejected.

The objection to the claims is respectfully traversed. Claims 1, 11, and 20 have been amended to remove reference to the non-elected species. Accordingly, Applicants respectfully request that the objection to the claims be withdrawn.

The rejection of Claims 1, 2, 10-12, 20, and 21 under 35 U.S.C. § 102(e) as being anticipated by Popescu (U.S. Patent No. 6,501,828) is respectfully traversed.

Popescu describes a computed tomography apparatus (1) including a gantry (2). The gantry rotates around an examination subject, a patient P, while a fan-shaped x-ray beam (7) emanates from an x-ray source (3), which penetrates the patient P and is incident on an x-ray detector (4) (Figure 1, column 4, lines 45-50). An adjustment of a plurality of elements (13, 14) of a collimator (11) of the apparatus ensues along a circular path (16) whose curvature center lies in a focus F of the x-ray source (column 5, lines 30-32).

Claim 1 recites an imaging system including “a radiation source configured to generate a beam...a collimator configured to collimate the beam to generate a collimated beam...a detector configured to detect the collimated beam, wherein the collimator is separate from said detector and...comprises at least one radio opaque member having a curved contour proportional to a contour of the detector.

Applicants respectfully traverse the assertion in the Office Action that Popescu describes a “curvature at the center of the detector is $1/R$, where R is the distance from the radiation source (F) to the center of the detector.” Rather, Popescu describes “a gantry 2 that is provided with an x-ray source 3 and an x-ray detector 4 and that is rotatable around a rotational center 5.” Accordingly, the curvature of the detector is related to the distance from rotational center 5 to detector 4, rather than the distance

from the radiation source (F) to the center of the detector as asserted in the Office Action. The present specification recites at paragraph [0031]:

[a] radius of curvature of collimator 122 is proportional to a radius of curvature of detector array 18. As an example, a radius of curvature of detector array 18 at a point 130 is $x+y$ centimeters (cm), where x is a radius of curvature of collimator 122 at a distance 132 from focal point 60, and where x and y are real numbers greater than zero. In this example, a radius of curvature of detector array 18 at a point 134 is $m+y$ cm, where m is a radius of curvature of collimator 122 at a distance 136 from focal point 60, and where m is a real number greater than zero. A radius of curvature of collimator 122 and detector array 18 is measured from focal point 60. Unlike distances 80 and 84, distance 132 is approximately equal to distance 136 because a contour of collimator 122 matches a contour of detector array 18.

As such, in the present invention, the radius of curvature of collimator and detector array is measured from the x-ray source focal point and Popescu describes that the curvature of the detector is related to the distance from rotational center to detector.

Moreover, Popescu does not describe or suggest an imaging system as recited in Claim 1. Specifically, Popescu does not describe or suggest a detector configured to detect the collimated beam, wherein the collimator is separate from the detector and includes at least one radio opaque member having a curved contour proportional to a contour of the detector. Rather, Popescu describes a computed tomography apparatus including an x-ray detector. Popescu does not describe the curvature of the detector other than the representation as an apparent curvature in the figures. The elements of the collimator are only described as having a curvature relative to a focus F of an x-ray source and are not described as having a curved contour proportional to a contour of the detector. Popescu recites at Column 5, lines 31-33, “[t]he adjustment of the elements 13, 14 preferably ensues along a circular path 16 whose curvature center lies in the focus F of the x-ray source 3.” A description of the curved detector as shown in Figure 1 of Popescu and the collimator elements that are adjusted along a circular path having a focus F as a center of curvature does not teach proportionality as recited in Claim 1. Accordingly, Popescu does not teach a first collimator including at least one radio opaque member having a curved contour proportional to a contour of the detector, but rather in the present invention, the radii of curvature of the collimator

and the detector array are both measured from the x-ray source focal point and Popescu describes that the curvature of the detector is related to the distance from the rotational center of the gantry to the detector. For the reasons set forth above, Claim 1 is submitted to be patentable over Popescu.

Claims 2, 10, and 22 depend from independent Claim 1. When the recitations of Claims 2, 10, and 22 are considered in combination with the recitations of Claim 1, Applicants submit that dependent Claims 2, 10, and 22 likewise are patentable over Popescu.

Claim 11 recites a computed tomography imaging system including “an x-ray source configured to generate a beam...a collimator configured to collimate the x-ray beam to generate a collimated x-ray beam...a detector configured to detect the collimated x-ray beam, wherein the collimator is separate from said detector and comprises at least one radio opaque member having a curved contour proportional to a contour of the detector.”

Popescu does not describe or suggest a computed tomography imaging system as recited in Claim 11. Specifically, Popescu does not describe or suggest a detector configured to detect the collimated x-ray beam, where the collimator is separate from the detector and includes at least one radio opaque member having a curved contour proportional to a contour of the detector. Rather, Popescu describes a computed tomography apparatus including an x-ray detector. Popescu does not describe the curvature of the detector other than the representation as an apparent curvature in the figures. The elements of the collimator are only described as having a curvature relative to a focus F of an x-ray source and are not described as having a curved contour proportional to a contour of the detector. Popescu recites at Column 5, lines 31-33, “[t]he adjustment of the elements 13, 14 preferably ensues along a circular path 16 whose curvature center lies in the focus F of the x-ray source 3.” A description of the curved detector as shown in Figure 1 of Popescu and the collimator elements that are adjusted along a circular path having a focus F as a center of curvature does not teach proportionality as recited in Claim 11. Accordingly, Popescu does not teach a first collimator including at least one radio opaque member having a curved contour proportional to a contour of the detector, but rather in the present invention, the radii of curvature of the collimator and the detector array are both

measured from the x-ray source focal point and Popescu describes that the curvature of the detector is related to the distance from the rotational center of the gantry to the detector. For the reasons set forth above, Claim 11 is submitted to be patentable over Popescu.

Claim 12 depends from independent Claim 11. When the recitations of Claim 12 are considered in combination with the recitations of Claim 11, Applicants submit that dependent Claim 12 likewise is patentable over Popescu.

Claim 20 recites a method for reducing dosage of radiation incident on a subject wherein the method includes “transmitting a beam of radiation toward the subject...collimating the beam of radiation before the beam reaches the subject...detecting, by a detector, the collimated beam of radiation, wherein the collimating is performed by a collimating device that is separate from the detector and includes at least one radio opaque member having a curved contour proportional to a contour of a detector that detects the collimated beam.”

Popescu does not describe or suggest a method for reducing dosage of radiation incident on a subject as recited in Claim 20. Specifically, Popescu does not describe or suggest detecting, by a detector, the collimated beam of radiation, where the collimating is performed by a collimating device that is separate from the detector and includes at least one radio opaque member having a curved contour proportional to a contour of a detector that detects the collimated beam. Rather, Popescu describes a computed tomography apparatus including an x-ray detector. Popescu does not describe the curvature of the detector other than the representation as an apparent curvature in the figures. The elements of the collimator are only described as having a curvature relative to a focus F of an x-ray source and are not described as having a curved contour proportional to a contour of the detector. Popescu recites at Column 5, lines 31-33, “[t]he adjustment of the elements 13, 14 preferably ensues along a circular path 16 whose curvature center lies in the focus F of the x-ray source 3.” A description of the curved detector as shown in Figure 1 of Popescu and the collimator elements that are adjusted along a circular path having a focus F as a center of curvature does not teach proportionality as recited in Claim 20. Accordingly, Popescu does not teach a first collimator including at least one radio opaque member having a curved contour proportional to a contour of the detector, but rather in the present

invention, the radii of curvature of the collimator and the detector array are both measured from the x-ray source focal point and Popescu describes that the curvature of the detector is related to the distance from the rotational center of the gantry to the detector. For the reasons set forth above, Claim 20 is submitted to be patentable over Popescu.

Claim 21 depends from independent Claim 20. When the recitations of Claim 21 are considered in combination with the recitations of Claim 20, Applicants submit that dependent Claim 21 likewise is patentable over Popescu.

For at least the reasons set forth above, Applicants respectfully request that the Section 102 rejection of Claim 1, 2, 10-12, 20-22 be withdrawn.

The rejection of Claims 3 and 13 under 35 U.S.C. § 103(a) as being unpatentable over Popescu in view of Okazaki (U.S. Patent No. 5,801,939) is respectfully traversed.

Popescu is described above. Okazaki describes system including a coarse positioner (101), which is driven by a servo motor or the like, has a large range of movement, a relatively low positioning resolution, and a relatively slow response speed (column 7, lines 27-29). The system includes a fine positioner (102) that is driven to produce movement by a piezoelectric actuator or the like (column 7, lines 32-34).

Claim 3 depends from independent Claim 1, which is recited above. As stated above, Popescu does not describe nor suggest an imaging system as recited in Claim 1. Moreover, Okazaki does not make up for the deficiencies of Popescu. Accordingly, Applicants respectfully submit that Claim 1 is patentable over Popescu in view of Okazaki.

When the recitations of Claim 3 are considered in combination with the recitations of Claim 1, Applicants submit that dependent Claim 3 is also patentable over Popescu in view of Okazaki.

Claim 13 depends from independent Claim 11, which is recited above. As stated above, Popescu does not describe nor suggest an imaging system as recited in

Claim 11. Moreover, Okazaki does not make up for the deficiencies of Popescu. Accordingly, Applicants respectfully submit that Claim 11 is patentable over Popescu in view of Okazaki.

When the recitations of Claim 13 are considered in combination with the recitations of Claim 11, Applicants submit that dependent Claim 13 is also patentable over Popescu in view of Okazaki.

For at least the reasons set forth above, Applicants respectfully request that the Section 103 rejection of Claims 3 and 13 be withdrawn.

In view of the foregoing amendment and remarks, all the claims now active in this application are believed to be in condition for allowance. Reconsideration and favorable action is respectfully solicited.

Respectfully Submitted,



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